5-8

The Impact on Western Europe of a Denial of Arab Oil --
With Consideration of Seasonal Factors and Alternative Inventory Policies

1. Seasonal factors play an important role in Western European demand for petroleum products. During the summer months, demand for gasoline rises markedly, while demand for fuel oils -- both distillate (lighter) oils and residual (heavier) oils -- drops off. Because the fuel oil category accounts for a much larger proportion of total demand (about 63 percent, as compared with about 20 percent for gasoline)*, the summer season in Western Europe is characterized by a net decline in demand for petroleum products of about 10 percent from the "norm" or trend value. These relationships are illustrated below as seasonal index numbers for consumption of selected petroleum products. The index values are expressed as percentages of the trend -- i.e. percentages of average quarterly consumption, corrected for increases in consumption unrelated to seasonal factors.

	Quarter			
	I	II	III	IV
All Petroleum Products	110	90	90	110
of which:				
Fuel Oils	119	85	83	113
Gasoline	87	104	113	96

2. The output of petroleum products from Western European refineries also shows some seasonal variation. This variation generally takes the same directions as does the variation in demand but is much smaller.

* The remainder consists of aviation fuel, kerosene and miscellaneous lubricating oil and greases.

Whereas the seasonal spread between peak demand for products in the winter and slack demand in the summer amounts to about 20 percent of the trend value, the seasonal spread between peak refinery output in winter and slack output in summer is only about 6 percent of the trend value. These relationships suggest that most normal seasonal demand variations in Western Europe are accommodated by variations in stocks of refined products.

3. Under the assumptions that were used in the recent project*, over the first 6 months of the denial of Arab oil the supply of oil for consumption would be about 20 percent below normal in Western Europe. Assuming a constant monthly supply, during the summer months (roughly the first three months of this 6-month period), decreased consumption due to seasonal factors would compensate for about half of this shortfall. If Western European governments also were willing to ration gasoline consumption to the extent of holding it to normal winter levels, nearly all of the remaining shortfall would be eliminated and no rationing of fuel oil would be necessary in the summer months. If the denial of Arab oil lasted beyond 3 months, the less severe the rationing employed in summer, the more severe would be the rationing required in the following winter when normal consumption is some ten percent above the annual average. Fuel oil stocks usually are built up during the summer months. If they were drawn down during warm weather, Western Europe would be in for a cold winter.

4. It was assumed in the previous report that oil stocks would be completely drawn down in 6 months. If the monthly supply of oil were held

* See ORR Project 25,5040, Impact on Western Europe and Japan of a Denial of Arab Oil, 6 June 67.

constant during this period, the drawdown of stocks would be largest the first month and would decline each succeeding month as imports of oil from non-Arab countries increased. Alternative assumptions as to European policy on oil stocks should also be examined. For this purpose it is most useful to examine supply of and demand for oil on a month-by-month basis.

5. To estimate the effects of various forms of rationing of oil consumption on stocks, the following assumptions were made:

(1) The growth of imports of oil from non-Arab countries follows a straight-line trend from month to month. (The average monthly availability of such imports during the 6-month period is the same as that assumed in the previous study.)

(2) Monthly demand for oil follows a normal seasonal pattern. This normal seasonal pattern is superimposed on a projection through 1967 of the trend based on data for earlier years.

(3) To hold down consumption of oil in Western Europe, 3 alternative rationing patterns are considered:

Assumption I: Gasoline consumption is held to the low December level throughout the period. This amounts approximately to the elimination of private automobile travel for vacations, while permitting the use of private autos for commuting.

Assumption II: Gasoline consumption is held to only 40 percent of its normal seasonal level, and fuel oil consumption to 90 percent of its normal seasonal level. In effect, virtually all private auto travel is

prohibited. The small fuel oil restriction probably would have no effect on industrial output.

Assumption III: Gasoline continues to be rationed as under II above, but fuel oil consumption is held at 60 percent of its normal seasonal level. This would force significant cuts in industrial production.

6. The monthly pattern of supply and demand for oil under the above assumptions, and the effects of this pattern on the net oil deficit and on oil stocks are shown in Table 1. Assuming that oil stocks in Western Europe, including oil in transit on the high seas, come to 2 months' average consumption at the start of the crisis (i.e. 16,600 bbl/day for one month)*, these stocks would be completely run down during the fifth month if there were no rationing. Mild rationing under Assumption I would result in the running out of stocks somewhat later during the fifth month. Rationing of type II, which could be characterized as "severe inconvenience," would postpone stock depletion until the seventh month. Under the very severe "hardship" rationing of type III, more than half the initial stock level (or some 30 days' supply would remain at the end of the seventh month.

* This is the estimate made in the previous study.

Table 1

Monthly Pattern of Supply and Demand for Petroleum
(Thousand Barrels per day, Crude Oil Equivalents)

	June	July	Aug	Sept	Oct	Nov	Dec
Normal Demand	7,100	7,200	7,300	7,400	7,800	9,200	11,000
Imports from Non-Arab Sources*	3,150	3,450	3,720	4,000	4,280	4,550	4,850
Deficit before Rationing	3,950	3,750	3,580	3,400	3,520	4,650	6,150
Deficit with Rationing**							
Assumption I	3,750	3,550	3,280	3,200	3,320	4,550	6,150
Assumption II	2,660	2,460	2,230	2,110	2,190	3,210	4,580
Assumption III	1,310	1,110	880	760	720	1,330	2,030
Number of Days' Oil Stocks Remaining at end of each month***							
Without Rationing	46	32	19	7	-	-	-
With Rationing							
Assumption I	46	34	22	10	-	-	-
Assumption II	50	41	33	26	18	6	-
Assumption III	55	51	48	45	43	33	31

* Includes "normal" imports plus increments.
** Rationing Assumptions are described in Paragraph 5 of text.
*** Assuming initial Stocks of 60 days' average supply.

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5	suggest that we hold off on		
6	supplement or up-date for a couple of weeks		

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Remarks: Ed: The attached paper is prepared in response to your request, and I believe gives a good "operational" appreciation of the situation. I feel that it would be useful to have this go out in some form as a supplement to the original paper. However, [redacted] tells me that it has not been 25X1A closely checked with [redacted] and his people, nor has it been checked against everything we are receiving from around town on this subject. 25X1A

I would appreciate your own immediate reaction to publication of this material, or to sending it in typescript form to selected customers.

/s/
WILLIAM N. MORELL, JR.
Director
Research and Reports

25X1A

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